



## **Challenges to application of the three points approach (3PA) - ambiguity in definition of event magnitude, spatial scales and goals**

**Madsen, Herle Mo; Rygaard, Martin; Andersen, Maj Munch; Mikkelsen, Peter Steen**

*Published in:*  
14th IWA/IAHR international conference on urban drainage

*Publication date:*  
2017

*Document Version*  
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

*Citation (APA):*  
Madsen, H. M., Rygaard, M., Andersen, M. M., & Mikkelsen, P. S. (2017). Challenges to application of the three points approach (3PA) - ambiguity in definition of event magnitude, spatial scales and goals. In *14th IWA/IAHR international conference on urban drainage* (pp. 1995-1997). [ICUD-0421] IWA Publishing.

---

### **General rights**

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

# ICUD-0421 Challenges to application of the three points approach (3PA) – ambiguity in definition of event magnitude, spatial scales and goals

H.M. Madsen<sup>1</sup>, M. Rygaard<sup>1</sup>, M.M. Andersen<sup>2</sup>, P.S. Mikkelsen<sup>1</sup>

<sup>1</sup> Technical University of Denmark, DTU Environment, Kongens Lyngby, Denmark

<sup>2</sup> Technical University of Denmark, DTU Management, Kongens Lyngby, Denmark

## Summary

This study examines the definition of climate adaptation in Copenhagen. It applies qualitative methods in collecting and analysing 32 interviews with professionals. The point of departure of the analysis is the Three Point Approach (3PA) which defines three different domains of stormwater control measures. The results show that the definitions used among actors cannot easily be divided into these three domains. Different actors apply different event magnitudes, spatial scales and goals, which affects their technology choices. Differences in definitions can lead to conflicts affecting implementation and innovation of climate adaptation, and thus the city's capacity for change.

## Keywords

climate adaptation, copenhagen, innovation, stormwater management, three points approach, qualitative approach

## Introduction

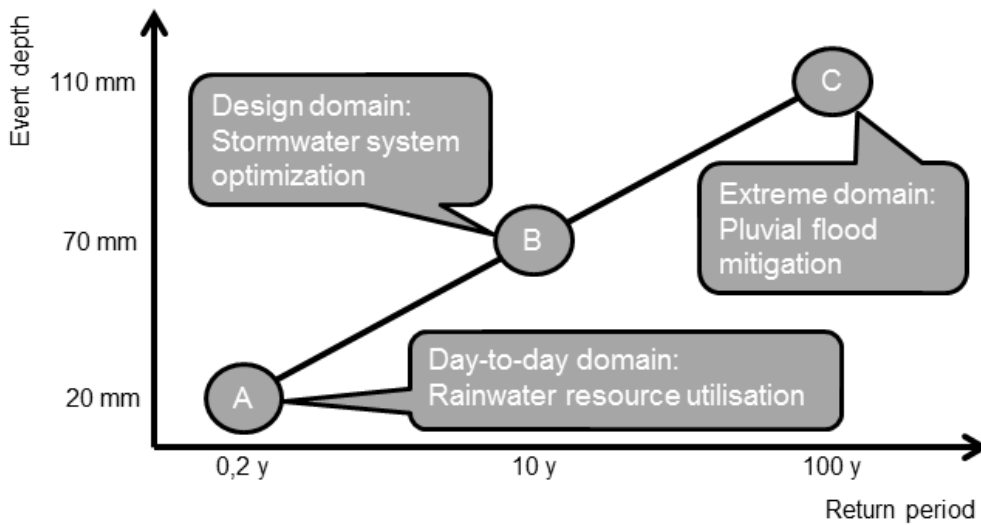
Previous studies have defined stormwater control measures and associated domains of the actors working with these through the Three Points Approach (3PA) (Fratini, Geldof, et al., 2012; Sørup, Lerer, et al., 2016) (Fig. 1). The domains are divided into: Domain A, day-to-day values and rainwater resource utilisation; Domain B, design and technical optimization of the stormwater system; Domain C, extremes, pluvial flood mitigation and urban resilience. In order to create a resilient stormwater system one should consider all three domains; however, different types of professionals tend to work in different domains (Fratini, Geldof, et al., 2012).

In Copenhagen, Denmark, stormwater management is linked to and almost synonymous with climate adaptation (Københavns Kommune, 2015). The city has already experienced significant damages and political turbulence as a result of extreme pluvial flooding. The professionals tasked with adapting the city to the future climate work with a range of solutions from large cloudburst tunnels, to separation of the sewage, to Water Sensitive Urban Design. They work in fast pace with more than 300 concurrent climate adaptation projects in Copenhagen and Frederiksberg Municipalities alone; plus an unquantified number of projects in the surrounding municipalities and on private property (Københavns Kommune, 2015). Practitioners with different backgrounds are working on a multitude of parallel projects; and it is unclear how well the scope and goals of these projects are aligned. Therefore, we have investigated the current definition of climate adaptation in Copenhagen using the 3PA as an analytical frame.

## Methods and Materials

Interviews were conducted in two rounds. The first round focused on the context of the city innovation system, and resulted in 6 semi-structured in-depth interviews with key actors. The

second round investigated three specific climate adaptation innovation and implementation cases and the actors' day-to-day processes, and resulted in 26 semi-structured in-depth interviews (Tab. 1). Copenhagen was chosen as an extreme case, while the innovation cases were chosen as maximum variation cases.



**Fig. 1.** The Three Point Approach, quantified for Danish conditions, adapted from (Sørup, Lerer, et al., 2016).

**Tab. 1.** Number of interview with actors. SME: Small and Medium-sized Enterprises, LE: Large Enterprises.

Actor type	Context	C1	C2	C3	Total
Utility	1	1	2	2	6
Municipal	1	0	1	2	4
Other governmental institution	1	0	2	0	3
Private companies, SME	4	4	2	0	10
Private companies, LE	0	0	3	3	6
Research	0	2	0	0	2
Other	1	0	0	0	1
<b>Total</b>	<b>8</b>	<b>7</b>	<b>10</b>	<b>7</b>	<b>32</b>

## Results and Discussion

Even though a formal academic approach to define stormwater management and climate adaptation is available through the 3PA, and even if the 3PA have started spreading informally among professionals in Denmark, this study shows that definitions among actors are segmented. Different actors apply different events, scales and goals when developing or implementing climate adaptation, which results in ambiguity and eventually different choices of technologies.

- Event magnitude: to what event size is the climate adaptation measure designed?  $T=0.2$ ,  $T=2$ ,  $T=5$ ,  $T=10$ , or  $T=100$  years?

- Spatial scale: at what scale should the climate adaptation work? Cadastre, roads, catchments, municipality, city, national?
- Goals: what goals does climate adaptation contain? Hydraulic, urban development, biodiversity, liveability, innovation?

If there is not agreement among the actors on one or more of these counts, conflicts can arise. The conflicts are prominent in several activities in regards to implementation of climate adaptation, however also present in knowledge-sharing and knowledge-developing activities. These conflicts can be mitigated by a constant statement and discussion of the above mentioned counts. There are however also examples of upscaling and personalising of conflicts.

In one of our case examples, a consultant defined climate adaptation as domain B and C in regards to event size, as domain A in regards to goals, while the scale of adaption was one road. While the responsible utility defined climate adaptation as domain A in regards to event size and goals, however optimizing for the catchment scale. The result was a conflict that escalated and even became personal, a consultancy that dissolved, and a series of climate adaptation projects that currently are uncompleted.

A consistent and transparent way to define climate adaptation and to design stormwater systems is to consider all three domains in regards to the chosen design scale. However, actors prioritize resources and therefore prioritize different parts of the domains. Currently, the most prominent definition is the linking of grey and green cloudburst solutions (domain C) within a water catchment system (scale: catchment) optimizing for both preventing damages and generating day-to-day values for the citizens (domain C and A, multifunctional).

## Conclusions

Naturally, the definition of climate adaptation the different actors apply varies from case to case including different event sizes, scales and goals and are actualized through different choice of technologies. However, the general definition of climate adaptation in Copenhagen remains diffuse both among actors and internally for most actors. The ambiguous definitions display the fact that climate adaptation is a new development in an old field of stormwater management. But the field is in on-going development with a large momentum, leading to new technologies, processes and implementation projects that may eventually lead to major innovations at the city scale.

## References

- Fratini, C. F., Geldof, G. D., Kluck, J., and Mikkelsen, P. S. (2012) Three Points Approach (3PA) for urban flood risk management: A tool to support climate change adaptation through transdisciplinarity and multifunctionality. *Urban Water Journal*, 9(5), 317–331.
- Københavns Kommune (2015) *Klimatilpasning- og investeringsredegørelsen*, København.
- Sørup, H. J. D., Lerer, S. M., Arnbjerg-Nielsen, K., Mikkelsen, P. S., and Rygaard, M. (2016) Efficiency of stormwater control measures for combined sewer retrofitting under varying rain conditions: Quantifying the Three Points Approach (3PA). *Environmental Science & Policy*, 63, 19–26.